What is claimed is:

1. A photoresist composition comprising:

a resin binder and a photoacid generator compound in an amount sufficient to permit development of an exposed coating layer of the composition, the photoacid generator generating an α,α-difluoroalkyl sulfonic acid upon exposure to activating radiation.

2. The photoresist composition of claim 1 wherein the sulfonic acid is of the formula RCF_2SO_3H, where R is optionally substituted alkyl having 1 to about 20 carbons, or R is an alkyl alicyclic group having from about 5 to about 20 carbon atoms, and R is not a perhaloalkyl.

3. The photoresist composition of claim 1 wherein the sulfonic acid is of the formula $R(CR^1R^2)CF_2SO_3H$, where R is optionally substituted alkyl having 4 to about 20 carbons, and R^1 and R^2 are each independently hydrogen or a non-hydrogen substituent.

4. The photoresist composition of claim 3 wherein R is an optionally substituted alicyclic group, an optionally substituted carbocyclic aryl group, an optionally substituted heteroalicyclic group or an optionally substituted heteroaromatic group.

5. The photoresist composition of any one of claims 1 through 5 wherein the photoacid generator is an ionic compound.

6. The photoresist composition of any one of claims 1 through 5 wherein the photoacid generator is an onium compound.

7. The photoresist composition of any one of claims 1 through 5 wherein the photoacid generator is an iodonium compound or a sulfonium compound.

8. The photoresist composition of any one of claims 1 through 5 wherein the photoacid generator is a non-ionic compound.

9. The photoresist composition of claim 8 wherein the photoacid generator is a sulfonate compound.

10. The photoresist composition of any one of claims 1 through 9 wherein the photoacid generator is a compound of Formula I, IA, II, IIA, III, IIIA, IV, IVA, V, VA, VI, VIA, VII or VIIA, as those formulae are defined above.

11. The photoresist composition of any one of claims 1 though 9 wherein the photoacid generator is an onium compound, a sulfonate compound, a disulfone, a diazosulfone, an α,α-methylenedisulfone, or a disulfonylhydrazine.

12. The photoresist composition of any one of claims 1-11 wherein the composition is a positive-acting photoresist.

13. The photoresist composition of any one of claims 1-11 wherein the composition is a chemically amplified positive-acting photoresist.

14. The photoresist composition of any one of claims 1-11 wherein the composition is a negative-acting photoresist.

15. The photoresist composition of any one of claims 1-11 wherein the composition is a negative-acting chemically amplified photoresist.

16. The photoresist composition of any one of claims 1 through 15 wherein the photoacid generator compound comprises one or more substituents of cyclopentyl, cyclohexyl, optionally substituted phenyl, pentafluorophenyl, optionally substituted thienyl, optionally substituted naphthyl,optionally substituted adamantyl, or optionally substituted isobornyl.

17. The photoresist of claim 16 wherein the substituent is a substituent of the sulfonate moiety of the photoacid generator compound.

18. A method for forming a photoresist relief image on a substrate comprising:

(a) applying a coating layer of a photoresist composition of any one of claims 1 through 17 on a substrate; and

(b) exposing the photoresist coating layer to patterned activating radiation and developing the exposed photoresist layer to provide a relief image.

19. The method of claim 18 wherein the photoresist coating layer is exposed to radiation having a wavelength of less than about 300 nm.

20. The method of claim 18 wherein the photoresist coating layer is exposed to radiation having a wavelength of less than about 200 nm.

21 The method of claim 18 wherein the photoresist coating layer is exposed to radiation having a wavelength of about 248 nm, 193 nm, 157 nm or 365 nm.

22. An article of manufacture having on at least one surface a coating layer of the photoresist composition of any one of claims 1-17.

23. An article of manufacture of claim 22 wherein the article is a microelectronic wafer substrate or a flat panel display substrate.

24. A photoacid generator compound that can generate an α,α-difluoroalkyl sulfonic acid upon exposure to activating radiation.

25. The photoacid generator compound of claim 24 wherein the sulfonic acid is of the formula RCF_2SO_3H, where R is optionally substituted alkyl having 1 to about 20 carbons, or R is an alkyl alicyclic group having from about 5 to about 20 carbon atoms, and R is not a perhaloalkyl.

26. The photoacid generator compound of claim 24 wherein the sulfonic acid is of the formula $R(CR^1R^2)CF_2SO_3H$, where R is optionally substituted alkyl having 4 to about 20 carbons, and R^1 and R^2 are each independently hydrogen or a non-hydrogen substituent.

27. The photoacid generator compound of claims 26 wherein R is an optionally substituted alicyclic group, an optionally substituted carbocyclic aryl group, an optionally substituted heteroalicyclic group or an optionally substituted heteroaromatic group.

28. The photoacid generator compound of any one of claims 24 through 27 wherein the photoacid generator is an ionic compound.

29. The photoacid generator compound of any one of claims 24 through 27 wherein the photoacid generator is an onium compound.

30. The photoacid generator compound of any one of claims 24 through 27 wherein the photoacid generator is an iodonium compound or a sulfonium compound.

31. The photoacid generator compound of any one of claims 24 through 27 wherein the photoacid generator is a non-ionic compound.

32. The photoacid generator compound of claim 31 wherein the photoacid generator is a sulfonate compound.

33. The photoacid generator compound of any one of claims 24 through 32 wherein the photoacid generator is an onium compound, a sulfonate compound, a disulfone, a diazosulfone, an α,α-methylenedisulfone, or a disulfonylhydrazine.

34. The photoacid generator compound of any one of claims 22 through 31 wherein the photoacid generator is a compound of Formula I, IA, II, IIA, III, IIIA, IV, IVA, V, VA, VI, VIA, VII or VIIA, as those formulae are defined above.

35. A method for preparing an α,α-difluoroalkyl sulfonic acid, comprising reacting a 1,1-difluoralkene with a sulfur compound to provide a 1,1-difluoro-1-sulfonic acid.

36. The method of claim 35 wherein the sulfur compound is sulfite or bisulfite.

37. The method of claim 35 wherein the sulfur compound is a thiol compound.

38. The method of any one of claims 35 through 37 wherein the alkene is reacted with an oxidizing agent in addition to the sulfur reagent.

39. The method of any one of claims 35 through 38 wherein the 1,1-difluoralkene is prepared by reacting a carbonyl compound with a difluoroacetic acid.

40. The method of claim 39 wherein the carbonyl compound is reacted with a phosphine in addition to the difluoroacetic acid.

41. The method of any one of claims 35 through 38 wherein the 1,1-difluoro-1-sulfonic acid is produced in a free radical reaction.

42. The method of any one of claims 35 through 41 wherein the sulfonic acid is of the formula RCF_2SO_3H, where R is optionally substituted alkyl having 1 to about 20 carbons, or R is an alkyl alicyclic group having from about 5 to about 20 carbon atoms, and R is not a perhaloalkyl.

43. The method of any one of claims 35 through 41 wherein the sulfonic acid is of the formula $R(CR^1R^2)CF_2SO_3H$, where R is optionally substituted alkyl having 4 to about 20 carbons, and R^1 and R^2 are each independently hydrogen or a non-hydrogen substituent.

44. The method of claim 43 wherein R is an optionally substituted alicyclic group, an optionally substituted carbocyclic aryl group, an optionally substituted heteroalicyclic group or an optionally substituted heteroaromatic group.